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2 A NEW APHID ON PENSTEMON IN THE SIERRA OF CALIFORNIA

BY E. O. ESSIG

University of California, Berkeley

A single specimen of a beautiful little green aphid was first collected by the writer on a seed bearing shoot of the mountain pride, *Penstemon Newberryi* Gray, in the Echo Lake Region of the Sierra Nevada Mountains, California. Although I had assiduously collected aphids almost every summer in this area since 1924, I first encountered this aphid on our cabin site, Upper Echo Lake, 7500 ft. altitude, on August 11, 1938.

The following year on August 11, 1939, a very large series of apterous females and a single apterous male were taken at this same locality. Although a persistent and diligent search extending over a week was made, no alate individuals could be found. On August 10, 1946 I made extensive collections at Upper Echo Lake and secured good series of sexuparae and sexuales. They were feeding chiefly on the ripening seed stalks of mountain pride.

Aphis sierra Essig, new species

Color. All forms, excepting the males, are deep green, often of a bluish cast. In life the mature apterae have a dark spot on the median dorsum of the abdomen. This spot may be due to body contents since it disappears when the specimens are cleared. The drawings (Fig. 1) show the black markings of the various forms. When cleared the pigmentation shows up very distinctly.

Apterous viviparous female (sexupara). Very small, somewhat robust and almost triangular in shape. Smooth and with few hairs. A pair of lateral tubercles present on prothorax and on abdominal segments I and VII. Pale or bright green with conspicuous dark spot on the dorsum in life which does not appear in the cleared and mounted specimens. Antennae black excepting basal half of segment III. Cornicles and cauda black (the base of the latter clear). Legs pale, dusky and black as illustrated. Antennae scarcely more than half as long as the body; I, 0.02 mm.; II, 0.02 mm.; III, 0.23 mm.; IV, 0.15 mm.; V, 0.15 mm.; VI, 0.28 mm. (base 0.08; unguis 0.20 mm.); total 0.85 mm. Secondary sensoria absent. Rostrum

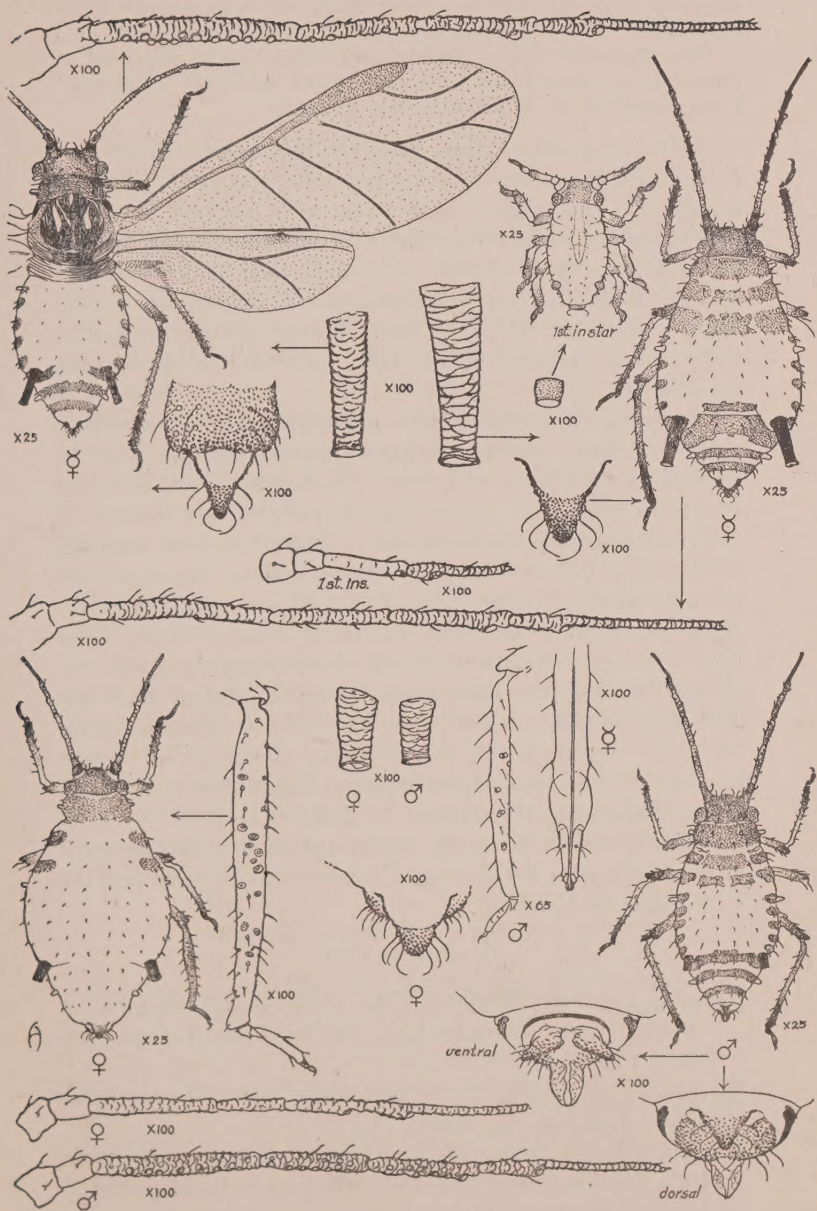
slender, extending to the base of the abdomen. Cornicles black; nearly cylindrical, wider at base and gradually narrowing apically; imbricated, with slight flange, length 0.23 mm. Cauda rough and scaly; triangular with wide clear base and bluntly rounded black apical half; with 3 pairs of fine recurved spines. Length of body 1.5 mm.; width 0.7 mm.

Alate viviparous female (sexupara). Mostly black with green and dusky abdomen. Rather slender, with few hairs which are short on the body and antennae and rather long on the legs. Antennae a little more than half the length of the body. Length of segments: I, 0.06 mm.; II, 0.06 mm.; III, 0.29 mm.; IV, 0.17 mm.; V, 0.17 mm.; VI, 0.30 mm. (base 0.08 mm.; unguis 0.22 mm.); total 1.05 mm. Secondary sensoria circular, arranged in an uneven row along the full length of segment III, varying from 11 to 18 in number; none to 2 (in a single case) on segments IV, V, and VI. Wing veins clearly defined; mediae of fore wings with second fork 0.4 the distance from margin of wing to the first fork; radial sector only slightly bent. Rostrum as in apterae. Cornicles black, cylindrical; heavily imbricated, 0.20 mm. long. Cauda triangular, rather sharply-pointed as indicated in accompanying drawing. Length of body, 1.5 mm.

Oviparous female (sexual). Apterous; slightly smaller than the apterous viviparous female and much paler in color and with only remnants of the dark dorsal markings. Antennae short; length of segments: I, 0.04 mm.; II, 0.05 mm.; III, 0.17 mm.; IV, 0.10 mm.; V, 0.12 mm.; VI, 0.22 mm (base 0.08 mm.; unguis 0.14 mm.); total 0.70 mm. Secondary sensoria absent. Rostrum extending beyond coxae of the hind legs. Hind tibiae slightly swollen and with sensoria distributed sparsely over the whole area excepting the basal and distal portions. Cornicles dusky, short, cylindrical, imbricated. Cauda dusky, much as in the apterous viviparous female. Length of body 1.24 mm.

Male (sexual). apterous, almost wholly black with dark green markings on thorax and abdomen; small, slender active. Antennae almost as long as the body. Length of segments: I, 0.04 mm.; II, 0.05 mm.; III, 0.22 mm.; IV, 0.15 mm.; V, 0.15 mm.; VI, 0.21 mm. (base 0.08 mm.; unguis 0.17 mm.); total 0.86 mm. Small circular secondary sensoria numerous and variable in numbers. They are distributed as follows: III, 11 to 25 (in one specimen 4-7); IV, 10-13 (in one specimen 20; in another 4); V, 6-12; VI, none. Rostrum extending well beyond the third coxae. On the hind tibiae of at least one individual, possibly an intermediate, were a number of single or paired sensoria-like organs similar to those found on certain oviparous females. (Fig. 1). Cornicles very short, about same

Fig. 1. *Aphis sierra* Essig, n. sp. Winged and apterous viviparous females, apterous oviparous female, apterous male, first instar young with important characters greatly enlarged. Drawings by Frieda Abernathy.



length as the cauda. Cauda broadly triangular. Claspers and penis as drawn.

Ova. Regularly oval. Mounted oviparous females appeared to contain one or possibly not more than two or three ova. These were being deposited on the plants in late August.

Aphis sierra differs from *Aphis pentstemonicola* Gillette and Palmer (1929a) in rarely having secondary sensoria on antennal segment IV, and without such sensoria on segment V of the alate viviparous female; with triangular rather than conical cauda; and with many more sensoria on the hind tibia of the oviparous females. It differs from *Aphis pentstemonis* Williams in having larger sensoria on III in the alates, shorter antennae with relatively shorter segments; and wider and shorter cauda with fewer hairs.

The specimens studied consist of a large series of individuals cleared in lactic acid-balsam-alcohol mixture and mounted in Euparal on 44 microscopic slides. These were mostly apterous viviparous females and 2 alates, and a goodly number of apterous oviparous females and apterous males. These have been variously designated as follows: *Holotype*—alate viviparous female—wings not quite perfect, UPPER ECHO LAKE, CALIFORNIA, August 10, 1946. *Morphotype*—apterous viviparous female, Upper Echo Lake, California, August 10, 1946. *Morphotype*—apterous oviparous female, Upper Echo Lake, California, August 10, 1946. *Andratype*—apterous male, Upper Echo Lake, California, August 10, 1946. *Paratypes*—all the remaining specimens of various kinds of all those studied. Collected at Upper Echo Lake, California, August 11, 1938, August 11, 1939, and August 10, 1946. All these specimens are in the author's collection. Paratypes are to be deposited in the California Academy of Sciences and the U. S. National Museum.

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A NEW MYRMECOPHILOUS MILLIPED FROM MEXICO

BY RALPH V. CHAMBERLIN

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Salt Lake City, Utah*

Specimens of the new polydesmid diplopod described below were received recently from Dr. Alfonso Dampf, Professor of Applied Entomology of the Escuela Nacional de Ciencias Biológicas, Mexico City, D.F. Concerning these millipeds Dr. Dampf writes: "Diploids marching with military precision in a column of migrating ants are not often seen. I collected therefore the 15 specimens which I saw during a half hour's watch in the citrus grove of Sayula. The ants [a black species of an army ant, identified by Dr. Neal A. Weber as *Eciton (Labidus) praedator* F. Smith] were traveling up hill in the undulating terrain of the grove in the morning in a fast running stream 4 to 6 individuals deep, some carrying insect remains. The diplopods, plainly visible on account of their white color, were moving slowly, but without any stop, in the center of the column. No ant paid any attention to them. As the ants were running so fast, sooner or later the last of the ants would pass one by one the slow diplopods which have then to follow the same trail by smell in case they were to get to the new nest. Our time was limited and we could not stay longer to see what would happen to these ant pets."

The adult male holotype and allotype, and some of the paratypes are retained by the author, the others being returned to Prof. Dampf.

Yucodesmus dampfi Chamberlin, new species

The dorsum is naturally pale yellow in color, with the venter and legs white or nearly so; but older individuals may appear brown from dirt adherent to the granula and tubercles.

Vertex and frons of head densely granulo-tubercular, elsewhere smooth; antennae with fifth joint large, moderately widening clavately from base to distal end, obviously longer than the fourth and sixth articles together, these two being relatively small.

Horizontal rim of the collum divided into the usual 12 areas by radiating sulci, the margin presenting 12 corresponding, low crenatures; surface granulo-tubercular, the tubercles arranged in two

transverse series, an anterior one across middle composed of six tubercles, and a posterior one composed of four.

The other tergites also granulo-tubercular, the large tubercles being arranged in the usual four rows, with three contiguous tubercles in each row. Keels long in the transverse direction; those on second to fourth segments with three lobes or crenatures, the fifth and succeeding one with four; the poriferous cone projecting about the third lobe. Lobes on 19th keels but weakly indicated. Anal tergite deeply notched at middle of caudal margin and with two lobes on each side toward base.

The gonopods of the male with telopodite as shown in the accompanying figure 1. Its form is distinctive, e.g., in the geniculate lower prong.

Length, about 6 mm.



Fig. 1. *Yucodesmus dampfi* Chamberlin, n. sp. Right gonopod of male, aspect a little ventrad of caudad.

Locality. MEXICO: STATE OF VERACRUZ, about 30 km. west of the port of Veracruz on the Hacienda Sayula. Fifteen specimens, mostly immature, taken September 24, 1946, by Dr. Alfonso Dampf.

The Hacienda Sayula is situated "in the flat coastal plain probably not more than 5 m. above sea level; swampy grassland with patches of trees and bushes; the specimens were collected in a citrus grove on the northern side of the hill with the administration buildings, at 8 o'clock in the morning, the weather somewhat cloudy, in a stream of army ants which were migrating up hill."

R THE GENUS ERYTHROTHRIPS MOULTON

(Thysanoptera: Orothripini)

BY STANLEY F. BAILEY

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As new genera in the Aeolothripodea have been described, various workers (particularly Bagnall, 1913, '24, '26, '30, and '31 and Hood, 1915) periodically have revised upward the subgroups, creating new sub-families and families for a relatively small number of genera. This super-structure seems rather cumbersome considering the small number of species involved, especially when compared with other orders of insects. These higher groups have been separated chiefly on the number of segments in the maxillary palpi as compared with the number in the labial palpi and the number of terminal antennal segments that exhibit, more or less, the lack of free articulation. Treherne (1919), however, separated *Erythrothrips* from related genera on the number of segments in the labial palpi. Priesner's review (1939) of the aeolothripid subfamilies makes use of other characters such as the armature of the fore legs, the sensory areas, and the chaetotaxy of the pronotum which de-emphasizes the above mentioned characters to advantage.

In studying the related genera of aeolothripids one notes a reduction in the number of segments in the maxillary palpi from eight in *Erythrothrips*, seven in *Orothrips*, *Stomatothrips*, and *Desmothrips* to five or six in *Audiothrips*, four in *Eucerathrips*, and three in *Aeolothrips*. In the genus *Erythrothrips* alone, the number of maxillary segments varies from five in *nigripennis* to nine in some individual specimens of *fasciculatus*. If then, for convenience, one draws the line at five maxillary segments, the genera falling into the tribe Orothripini Pr., 1939, are *Allelothrips* Bagn., *Audiothrips* Mlt., *Desmothrips* Hd., *Erythrothrips* Mlt., *Orothrips* Mlt., and *Stomatothrips* Hd.

What appear to be thirty valid species in the Orothripini have been described in these genera and it is now possible to better evaluate the generic characters. A key to these genera is given below.

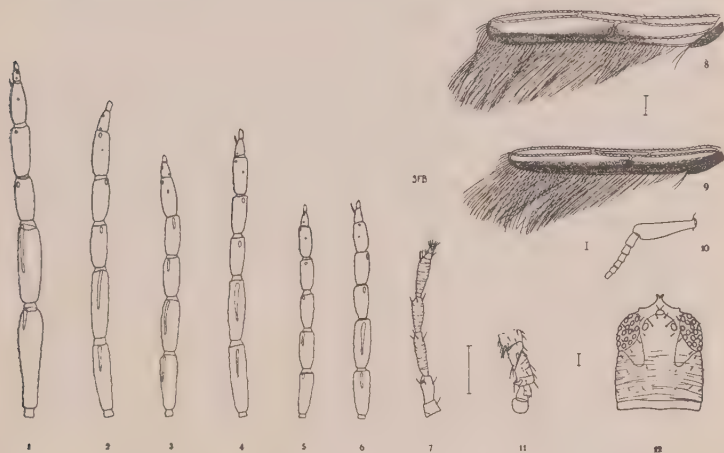
KEY TO THE GENERA OF OROTHRIPINI PRIESNER, 1939

1. All antennal segments articulated. Antennal segments III and IV each with two similar sensory areas. Fore wings slightly broadened towards tip.....*Orothrips* Moulton, 1907
(No. America and India)
- Terminal antennal segments more or less shortened and united. Antennal segments III and IV with a single sensory area on each segment 2
2. Fore wings markedly constricted in basal third.....3
- Fore wings not so constricted.....4
3. Sensory areas on antennal segments III and IV linear, similar, and parallel with length of segment, that on IV hooked at distal end.....*Stomatothrips* Hood, 1912
- Sensory areas on antennal segments III and IV sinuately vermiform, that on IV reaching to the basal third of joint.....*Allelothrips* Bagn., 1932
4. Antennal segments V to IX closely united. Sensory areas on antennal segments III and IV not alike; that on segment III long, narrow and parallel with segment, sensory area on segment IV near tip, expanded at distal end and partly encircling segment at an oblique angle.....*Desmothrips* Hood, 1915
(Australia)
- Antennal segments VIII and IX short and not clearly articulated. Sensory areas on antennal segments III and IV similar.....5
5. Sensory areas on antennal segments III and IV extending full length of segments.....*Audiothrips* Moulton, 1930
(So. Africa)
- Sensory areas on antennal segments III and IV not extending more than two-thirds the length of the segments and lying in the distal portion.....*Erythrothrips* Moulton, 1911
(No. and So. America and India)

The genus *Erythrothrips* was described by Moulton in 1911, based on the species *arizonae*. Since this time eight additional species have been described of which one is from India, three from South America, and one from Mexico. Only three species are known from California (Bailey, 1935, 1937).

A tabulation of all characters of the described species of *Erythrothrips* was made in this study but, since not all nine species were available for study, especially in series, the key given below is partly based on the descriptions only. The species *durango*, *bishoppi*, and *stygius* each was based on an unique female. The latter, a South American species, is strikingly distinct with its black wings and antennae. The writer has four female specimens of *durango* from Texas and its clear yellow third antennal segment readily separated it from the other North

American forms. These specimens were compared with Watson's type. Moulton's *bishoppi* is very difficult to separate from *arizonae*. The writer has studied the type of *bishoppi* and found it very difficult to accurately count the number of segments in the maxillary palpi. In comparing the antennae of *arizonae*, *bishoppi*, and *fasciculatus* (see figures 4, 5, and 6) it can be seen that *bishoppi* is between the two in length of segments and size of sensory areas. Until a series of this species is collected, it (the holotype) can best be told from *arizonae* by the shorter head. The types of *arizonae*, *fasciculatus*, and *keeni* also have been examined.



Erythrothrips. Antenna of: 1, *nigripennis* (redrawn from Hood 1937a, fig. 1b); 2, *keeni*; 3, *durango*; 4, *arizonae*; 5, *fasciculatus*; 6, *bishoppi*; 7, mature larva of *fasciculatus*. Fore wing of: 8, *keeni*; 9, *durango*. Figure 10, Maxillary palpus of *durango*. Figure 11, front tarsus of *keeni*. Figure 12, dorsum of head of *arizonae*. Scale: Figure 7, line equals 0.1 mm. Figure 8, line equals 0.1 mm. Figures 10 and 11, line equals 0.01. mm.

The males of *arizonae*, *asiaticus*, (see Ayyar, 1934, page 3), *fasciculatus*, *keeni*, and *costalis* only are known. Species differentiation in this sex is readily made on the basis of the chaetotaxy of the terminal abdominal segments.

ERYTHROTHRIPS Moulton, 1911

Head (figure 12) usually longer than wide, cheeks arched. Ocelli present. Postocular and interocular bristles nearly always weak.

Compound eyes rounded dorsally and produced in an angular manner ventrally. Antennae nine-segmented with the last two segments closely joined and their length together less than segment VII. One sensory area on segments III and IV (see figures 1-6). Maxillary palpi geniculate (figure 10), the basal segment usually as long as remaining four to seven segments. Labial palpi four-segmented. Mouth cone blunt and not projecting beyond posterior margin of prothorax. Prothorax small, about as long as wide and but little shorter than head, with all setae small. Legs slender, fore femora thickened. Fore tarsi with finger-like hook (figure 11). Wings (figures 8 and 9) large, bluntly rounded with typical aeolothripid venation. Abdomen in female robust, terminal segments long and abruptly pointed. Ovipositor upturned. Male much smaller than female; sensory areas on antennal segments smaller and abdomen very slender.

Genotype: *E. arizonae* Moulton, 1911 by monotypy.

The larva of *E. arizonae* was illustrated by Moulton (1911, Plate I, fig. 7) and described briefly (page 36) as follows—"The larva of this species is uniformly light brownish-yellow and has conspicuous red pigment bands across the dorsal plates of mesothoracic and metathoracic segments and all segments of abdomen." The larva of *E. fasciculatus* is very similar in coloration and appearance. For comparison with the adult, we have illustrated the antenna of a mature larva (figure 7). The larvae of the other species are unknown.

KEY TO THE SPECIES OF ERYTHROTHRIPS

1. (2) Fore wings uniformly dark blackish brown.....2
- Fore wings with posterior half with blackish brown longitudinal band 3
2. (1) Third antennal segment black.....*stycticus* Hood, 1938
- Third antennal segment golden yellow.....*nigripennis* Hood, 1937
3. (1) Fore wings with dark band along distal two-thirds of posterior margin only (scale black) (figure 8).....*keeni* Moulton, 1929
(see also Moulton, 1927)
- Fore wings with dark band extending the entire length of posterior margin (figure 9).....4
4. (3) Segment III of antenna light yellow.....5
- Segment III of antenna bicolorous, yellow at base and shading to dark brown in outer portion.....6
5. (4) All tibiae and tarsi lemon yellow in color.....*asiaticus* A. and M.
1930-1931
- All tibiae and tarsi dark brown.....*durango* Watson, 1923
6. (4) Segment III of antenna very long (200 microns). Distal three-fifths of segment II yellow.....*costalis* Hood, 1937
- Segment III of antenna much shorter. Segment II uniformly dark brown 7

7. (6) Sensory area on antennal segment III very short (about 16 microns) and often oval (figure 5).....*fasciculatus* Moulton, 1929
(see also Moulton, 1927)
- Sensory area on antennal segment III extending at least one-third the length of segment, narrow and often curved.....8
8. (7) Head longer than wide. Sensory area on antennal segment III about 60 microns (figure 4). Maxillary palpi 8-segmented.
.....*arizonae* Moulton, 1911
- Head about as long as wide. Sensory area on antennal segment III about 33 microns (figure 6).....*bishoppi* Moulton, 1929

Large or wide-spread collections of *Erythrothrips* have not been reported. This is probably not because of their scarcity but because of their limited hosts, their appearance for a short seasonal period in the blossoms, and occurrence almost entirely at high altitudes. There is only one generation a year (Bailey, 1940) at least in the case of the species found in California. This is similar to nearly all other aeolothripids in this region. The life history of none of the *Erythrothrips* species has been previously reported. The details of the life history of *E. fasciculatus* Moulton only, are known to the writer, but this species is doubtless typical of the majority of the members of the genus.

The adults emerge from the soil beneath the host plant as it comes into bloom in late spring or early summer. The eggs are inserted into the flower parts and green stems and the larvae hatch about the time the petals fall. There are two larval instars and this stage develops in about 10 days. When mature, the larvae drop to the ground beneath the host, penetrate the soil, crawl down among rocks, leaf debris, etc. and, when a suitable niche is found they spin a cocoon (Bailey, 1940). The time of the year at which they transform to pupae is not known but is doubtless in the fall.

During their period of life on the host plants, the California species, at least, are extremely active in both the larval and adult stages. These thrips appear to be plant feeders although they may be predacious on occasion (Treherne, 1921) and are limited to a very small number of hosts, usually one preferred host being indicated in a locality. None of the principal hosts are crops.

The distribution of the genus, with the exception of *E. asiaticus* A. and M., is limited at present to the Pacific Coast, the south-west. Mexico, and Peru. Further collecting will almost certainly extend this genus to the mountainous areas of Canada, Central America, and other western states of the United States.

CATALOG OF THE SPECIES OF ERYTHROTHRIPS MOULTON, 1911

1. *arizonae* Moulton, 1911. Genotype. North America. Arizona: Phoenix. Nevada: Las Vegas. California: Oroville, Tehachapi Pass, Mt. Springs (Panamint Mts.), Palm Canyon, Onyx, Furnace Crk. Camp (Death Valley), Mazorka Can. (Inyo Mts.). Blossoms of orange, olive, *Rhamnus purshiana*, a legume, *Stanleya*, creosote bush, cat's claw, Joshua tree flowers. April to June, depending on elevation.
2. *asiaticus* A. and M., 1930-31. Southern India: Coimbatore, Bangalore, No. Salem, and Salem. Grass sweepings, cocoanut, mango leaves, sandal, and *Canthium didymum*.
3. *bishoppi* Moulton, 1929. North America. Texas: Sonora. Black walnut. April.
4. *costalis* Hood, 1937b. South America. Peru: Chachapayas and Almirante (Departamento Amazonas). *Spartium junceum* flowers and on a dead branch. 2000 meters elevation. December.
5. *durango* Watson, 1923. North America. Mexico: Tlahualilo (Durango). Texas: El Paso (Summit Mt.), Del Rio. Agave flowers, live oak. May.
6. *fasciculatus* Moulton, 1929. North America. California: Bear Crk. (Lake County), Mix can. (Solano County), Mt. Diablo, Briceburg, Indian Flat (Mariposa County), Arbuckle. *Adenostoma fasciculatum* flowers, yellow clover, California sage. May to July, at low elevations, chiefly in coast range of mountains.
7. *keeni* Moulton, 1929. North America. Oregon: Bly. Utah: Logan Canyon. Nevada: Wells. California: Markleeville and Ebbett's Pass (Alpine County), Convict Lake, Rock Creek, Sonora Pass, Bishop Creek (Inyo County). *Chrysothamnus viscidiflorus*, *Mentzelia laevicaulis*, white yarrow blossoms, Ceanothus, wild buckwheat. July and August at high elevations up to 9000 feet.
8. *nigripennis* Hood, 1937a. South America. Peru: Vicinity of Celendin (in Andes). Departamento de Cajamarca. *Cassia latipetiolata* D. and *Delostoma dentatum* Don. Flowers. May-June.
9. *stygius* Hood, 1938. South America. Peru: Almirante (Departamento de Amazonas). In flower of unidentified plant. December. 1900 meters elevation.

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A NEW GENUS *USANUS* AND NEW SPECIES OF MEXICAN LEAFHOPPER RELATED TO *CHLOROTETTIX*

BY DWIGHT M. DeLONG

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A bizarre species of leafhopper from the standpoint of both the color pattern and unique genitalia has been collected in Mexico at Iguala. A new genus and species is being erected to accomodate this insect.

Genus Usanus DeLong, new genus

In form resembling a broad headed *Chlorotettix*. The vertex is short, broadly rounded and broadly rounding to the front. The venation of the elytra is simple and reduced. There are no costal veinlets. The cross vein forming the first apical cell is just anterior to the cross vein forming the second apical cell. The third apical cross vein is more anterior than either of the others. The clypeus is broader at the apex than at the base.

Usanus stonei DeLong, new species

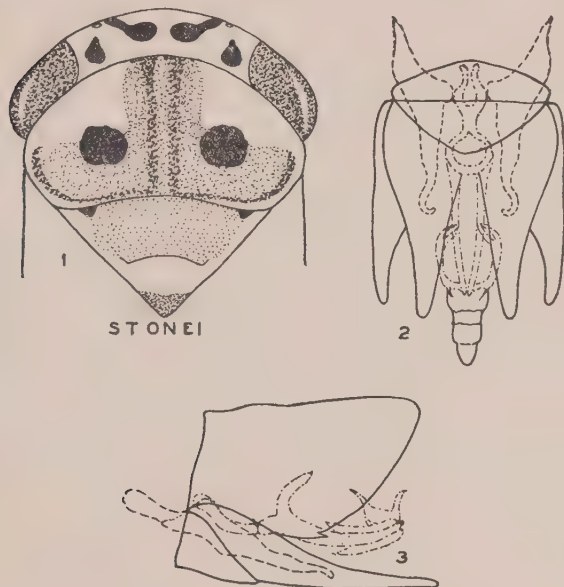
A broad blunt headed species with a pair of oblique black dashes on the margin and a pair of large round black spots on the pronotum. Length, 6 mm.

Vertex short and broad and broadly rounded between the eyes; more than four times as wide between eyes as median length; broadly rounded to the front. Pronotum almost four times as long as vertex.

Color: Vertex cream with a pair of heavy oblique black marks extending over margin to just above apex and enlarged where they converge at the median line just above apex. A small black spot on the base next each eye. Pronotum gray with a large round black spot about the middle each side on the posterior portion of the disc. Scutellum brownish anterior to median impressed line; white on posterior portion. Elytra whitish subhyaline; veins black.

Genitalia: Male plates elongate, triangular, apices narrow but blunt. Style elongate, tapered, apical half narrow, curved inwardly and basally at apex. Aedeagus rather robust with a basal dorsally directed process. At the apex there is a broad quadrate process which bears a rather long finger-like dorsally directed spine both anteriorly and posteriorly on each side.

Holotype, male, and male paratypes collected at IGUALA, GRO., Oct. 22, 1941 (K. 188, Mexico City, Acapulco Road) by E. E. Good and D. M. DeLong.



Usanus stonei DeLong, n. sp. Fig. 1, dorsal view of head, pronotum and scutellum; Fig. 2, ventral view of male genitalia; Fig. 3, lateral view of male genitalia.

A NEW SPEYERIA FROM WASHINGTON

BY F. H. CHERMOCK AND D. P. FRECHIN

Butler, Penn., and Bremerton, Wash.

Speyeria cybele pugetensis Chermock and Frechin, new race

Mean expanse of series, 70-80 mm. Average, 75 mm.

Both sexes resemble *leto* (Behr.), (Proc. Cal. Acad. Nat. Sci., vol 2, pp. 172-177), but are at once separable by several diagnos-

tic characters. Above, *pugetensis* is noticeably melanic. The males show an accentuated bold dark pattern, especially noticeable in the dark marginal markings. The basal and discal areas show a heavy suffusion of very dark fuscous, often completely obliterating the discal black pattern. The same areas under surface are also correspondingly much darker than normal *leto*. The brown marginal bands of the under surface are accentuated and unbroken. This results in a noticeable reduction in the width of the dull yellow belt of the secondary. The submarginal crescents are usually imperfectly formed and reduced in size, with less silvering than in the general run of *leto*. The secondary belt is seldom straw yellow, and is usually overcast with light brown scaling.

The females also show all dark markings accented, with these markings intense black. *Pugetensis* never exhibits the brownish-black washed-out appearance demonstrated by *leto* and *letona*. On the upper surface the basal and discal areas are so completely suffused with black fuscous that the normal *leto* pattern is completely obliterated. An occasional example shows the yellow bar in the cell of the fore wing. The under surface shows the diagnostic pattern of the male, with the brown markings replaced by black to brownish-black. The submarginal lunules are usually well-formed and distinct.

Holotype, male, July 12, 1945, STIMSON CREEK, NEAR BELFAIR, MASON COUNTY, WASH. Allotype, female, August 4, 1945, STIMSON CREEK, NEAR BELFAIR, MASON COUNTY, WASH. Paratypes 1-390, various localities in Mason, Kitsap, Thurston and Clallam counties, Wash. Paratypes 391-400, Portland and McMinnville, Oregon.

The holotype, allotype, and paratypes will be deposited in the collection of the American Museum of Natural History. Paratypes will also be distributed to other museums, specialists, and private collections.

Pugetensis represents a *leto* dispersal to the extreme Northwest, culminating in this large, melanic population, indicative of the humid environment. East of the Cascade Crest, *leto* is again found in near typical form, but showing a slight tendency towards *letona* dos Passos and Grey (Am. Mus. Nov., No. 1297, 1945). In extreme northeastern Washington, the junior author has taken examples of *letona* that match topotypes nicely.

We wish to acknowledge the aid of Mr. L. P. Grey, who kindly compared our material with the types of *letona* and topotypes of the other western races of *cybele*.

TAXONOMY OF THE LARVAE OF SOME NORTH
AMERICAN NOVIINI
(Coleoptera, Coccinellidae)

BY BRYANT E. REES*

Fresno State College, Fresno, California

Of the numerous species of Coccinellidae named and described, *Rodolia cardinalis* (Mulsant) has received a major portion of publicity. The quantity of literature regarding this species is great, but too little deals with the morphology and taxonomy of its larva in relation to the larvae of closely related species. Although a comprehensive study of the approximately 55 known species of the tribe Noviini is desirable, owing to the lack of study material this paper deals only with the larvae of the species occurring in America north of Mexico.

As proposed by previous authors and now accepted, *Exoplectra subaenescens* Gorham is placed in the Exoplectrini, and *Novius koebelei* Coquillett is transferred to the genus *Rodolia*. Such being the case, the tribe Noviini is represented in North America principally by two genera: *Rodolia*, through the introduction of *R. cardinalis* and *R. koebelei* into California from Australia, and *Anovia*, native to the southwestern states and represented by its single species, *A. virginalis* (Wickham). Another monobasic genus of the tribe is represented in Mexico by *Vedalia seiboldi* Mulsant.

The larvae of *Rodolia cardinalis* and *R. koebelei* were described by Coquillett in 1889 and 1893, respectively. Following this author, others have redescribed the larva of *R. cardinalis*, but the descriptions are inadequate for practical taxonomic purposes. It seems desirable, then, to redescribe and compare the larvae of the species in question and to formulate a key by means of which they may be distinguished. The descriptions herein given are based upon larvae taken with associated adults or upon reared material. The identifications of the adults were made or verified by E. A. Chapin, United States National Museum, Washington, D. C.

*Formerly with the Bureau of Entomology and Plant Quarantine where this work was done.

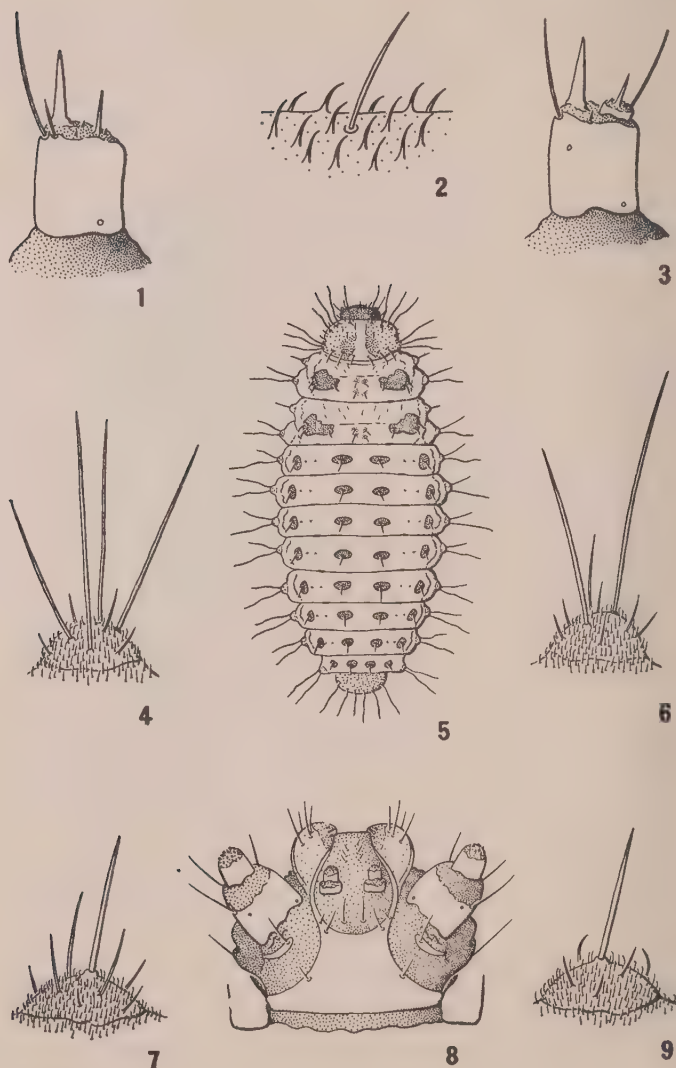


Fig. 1, antenna, *Anovia virginalis* (Wickh.); 2, asperities of body wall; 3, antenna, *Rodolia cardinalis* (Muls.); 4, lateral struma, *R. koebelei* (Coq.); 5, larva, *R. cardinalis*; 6, lateral struma, *R. cardinalis*; 7, dorsal struma, *R. koebelei*; 8, ventral mouthparts, *R. cardinalis*; 9, dorsal struma, *R. cardinalis*.

Since the larvae of the Coccinellidae exhibit a great variation in structure, some of them may be confused with the few chrysomelid larvae they closely resemble. They may be distinguished, however, from the chrysomelid and other larvae by the possession of various characters. In the larvae of the Coccinellidae the head always possesses three ocelli on each side and usually a depression located anteriorly on each frontal suture. The mandible is broad at its base, narrowed distally, usually with simple or bidentate apex, and generally possessing a distinct retinaculum. If the mandible is multidentate and bears a retinaculum, the teeth are small; if the mandible is multidentate and without a retinaculum, the teeth are large and digitiform. The stipes is fused with its corresponding cardo, and the hypopharyngeal bridge is present.

TRIBE NOVIINI GANGLBAUER

The tribe Noviini, as here interpreted, is based on the study of the three North American species and *Rodolia bellus* Blackburn from Australia. Its members may be distinguished from other coccinellid larvae by the fusion of the cardines, submentum and mental area into a solid, sclerotized and pigmented structure possessing a slender anterior extension on each side. The extensions pass anteriorly and laterally about the labial palpi and then converge in the buccal area. The entire structure assumes the appearance of an egg cup in which are encompassed the labial palpi. (See fig. 8.).

The close similarity of the larvae of the four species permits a further characterization of the tribe and general description applicable to all.

Body (fig. 5) ovoid, with greatest width at second and third abdominal segments; strongly convex dorsally, slightly convex ventrally; abdomen in general view with longitudinal series of strumae¹; pleura protuberant. Pronotum trapezoidal, lateral and anterior margins rounded, sparsely setiferous and with chalazae,¹ setae of chalazae long, pale yellow; tergite longitudinally divided by broad, semi-membranous, non-pigmented line, with dark area immediately on each side of midline, densely asperate and with each posterolateral angle elevated into struma. Mesonotum and metanotum each

¹*Chalaza*, a distinct, frequently slight, pimplelike projection of the body wall bearing a seta. *Struma*, a distinct, moundlike projection of the body wall upon which are situated a few chalazae.

incompletely divided transversely by shallow depression; tergites distinct, small, situated dorsolaterally, asperate and with setae and chalazae; mesopleura and metapleura each with small anterior and large posterior struma. Abdominal segments 1-8 each with inter-segmental pore, a dorsal, dorsolateral, and lateral struma on each side; pleura protuberant; ninth abdominal segment semicircular, broader than long, setiferous and with chalazae. Body membrane and sclerites, including strumae, with seta-like asperites. Legs well developed, slender, sclerotized and darkly pigmented; coxae of corresponding legs widely separated; tibia slightly longer than femur, with distinct, setiferous, semimembranous and non-pigmented, ventral surface or "sole"; terminal setae of tibia abruptly enlarged distally; claw gradually and evenly curved, base simple, broad.

Head small, pigmented, transversely subrectangular; epicranial suture lacking; frontal sutures indicated posteriorly by broad, non-pigmented, straight lines, indistinct and obsolete anteriorly; sutural fossae of head distinct, linear; head adorned with few long setae, principally about ocelli. Labrum, when viewed from above, subrectangular, broader than long, posterior and lateral marginal areas darkly pigmented, mesal and anterior areas non-pigmented and semimembranous. Antenna composed of one or two segments, if two-segmented, second segment small. Mandible apically simple, base enlarged, retinaculum present. Maxillary palpus two-segmented and with distinct, sclerotized and pigmented, narrow palpifer; first segment prominent, large, broader than long; second segment small, about one-half length and diameter of first. Mala bluntly subconical, proximally sclerotized and pigmented, distally non-pigmented and membranous. Labial palpus two-segmented, second segment longer but of less diameter than first. Premental sclerite lacking.

KEY TO GENERA AND SPECIES

1. Antenna composed of two segments; second segment small, short and broad (fig. 3).....*Rodolia*...2
- Antenna composed of a single segment (fig. 1).....
.....*Anovia virginalis* (Wickham)
2. Lateral strumae of abdominal segments 1-8 each with two chalazae of which the setae are conspicuous and long (fig. 6); head capsule without asperities.....*R. cardinalis* (Mulsant)
- Lateral strumae of abdominal segments 1-8 each with four chalazae of which the setae are conspicuous and long (fig. 4); head capsule with few short, spine-like asperities immediately lateral to each frontal suture.....*R. koebelei* (Coquillett)

GENUS *RODOLIA* MULSANT

The genus *Rodolia* is represented in this study by *R. cardinalis* and *R. koebelei*, but a third species, *R. bellus*, although

not included in this treatment of the genus, has been studied. If the larvae of these species are typical of the genus, the following characters may be considered applicable:

Antenna composed of two segments; first segment large, with stout, colorless, acute, sensory process on ventral terminal area and small second segment on dorsal terminal area; second segment about one-third or less size of first, terminally with slender, acute sensory process and several minute, acute, sensory papillae. Body with fine, seta-like asperities, asperities of membrane finer than of sclerites, those of membrane fine to extremely fine, sometimes lacking in dorsal areas. Strumae asperate and setiferous.

RODOLIA CARDINALIS (MULSANT)

Body sparsely setiferous, setae short; membrane and sclerites, including strumae, densely covered with fine, seta-like asperities and few fine, pale yellow setae (fig. 2). Pronotum with chalazae and fine setae; each posterolateral angle with three chalazae of which the setae are about three-fourths as long or as long as pronotum; mesothoracic and metathoracic tergites sparsely setiferous, each with single mesal and two lateral chalazae the setae of which are stout, stiff, and brown. Anterior struma of each mesopleurum and metapleurum with fine, pale, short setae and single chalaza with long, brownish-yellow seta; each posterior struma setiferous and with two chalazae, one anterodorsal to other, setae of chalazae about as long or longer than segment. Dorsal and dorsolateral strumae of abdominal segments 1-8 darkly pigmented, each with fine, brownish-yellow setae and single prominent chalaza with stout, stiff, brown seta, seta about one-third length of segment (fig. 9); each lateral struma of abdominal segments 1-8 bearing two chalazae (fig. 6), one anterodorsal to other, setae of chalazae one and one-half to two times length of segment, seta of anterodorsal chalaza one-half to three-fourths length of other, longer on posterior segments. Head uniformly pigmented, smooth, sparsely setiferous.

Material studied: Numerous specimens from California, Louisiana, and Mexico.

RODOLIA KOEBELEI (COQUILLETT)

Body with few, fine, pale yellow setae; membrane and sclerites, including strumae, very densely covered with fine, seta-like asperities, asperities of sclerites slightly coarser than of membrane. Pronotum with chalazae and fine setae; each posterolateral angle with three chalazae of which the setae are about as long as pronotum; mesothoracic and metathoracic tergites sparsely setiferous, each with single mesal and two lateral chalazae of which the setae are slender, slightly curved, brownish-yellow, prominent. Anterior

struma of each mesopleurum and metapleurum with fine, pale setae and single chalaza with long, pale yellow seta; posterior strumae each similarly setiferous and with four chalazae, one situated anteriorly, one posteriorly, one dorsally, and one ventrally, setae of chalazae about one and one-half times as long as segment, anterior seta shortest of four. Dorsal and dorsolateral strumae of abdominal segments 1-8 darkly pigmented, each with fine, pale setae and chalazae of various sizes of which the seta of one is long, brownish-yellow and about one-third as long as segment (fig. 7); each lateral struma of abdominal segments 1-8 bearing four chalazae (fig. 4), two horizontally and two vertically situated, setae of chalazae about one and one-half times length of segment, seta of anterior chalaza shortest of four, progressively longer to subequal on posterior segments. Head uniformly pigmented, setiferous, with small spine-like asperities lateral to each frontal suture.

Material studied: One specimen from California; three from Brisbane, Australia.

GENUS *ANOVIA* CASEY

The genus *Anovia* is represented by its single species, *A. virginalis* (Wickham). It is listed as occurring in Utah and Texas, but it has been taken in other southwestern states.

A. virginalis larvae can be distinguished from members of *Rodolia* principally by the number of antennal segments. In this species the antenna (fig. 1) is composed of a single segment as compared with the two-segmented antenna found in the species of *Rodolia*. Terminally, it possesses a stout, acute, colorless, sensory process, a similar but shorter sensory process, and several minute, acute, sensory papillae. The short, slender process appears to be homologous with that possessed by the small, second antennal segment of the *Rodolia*.

ANOVIA VIRGINALIS (WICKHAM)

Body sparsely setiferous, setae pale yellow; membrane and sclerites, including strumae, uniformly covered with fairly coarse, seta-like asperities, asperities separated by a distance approximately one-half to three-fourths length of one of the asperities. Pronotum with chalazae and setae, each posterolateral angle with two chalazae, setae of chalazae longer than surrounding setae. Mesothoracic and metathoracic tergites sparsely setiferous, setae of various sizes, each tergite with one mesal and two lateral chalazae each with long, brownish-yellow seta. Anterior struma of each mesopleurum and metapleurum with setae of various sizes and single chalaza with long seta; posterior struma similarly setiferous,

with two chalazae, one anterodorsal to other, setae of chalazae long and prominent. Dorsal and dorsolateral strumae of abdominal segments 1-8 pigmented, each with fine, pale setae and chalazae of various sizes, seta of one prominent, brownish-yellow, about one-third as long as segment (see fig. 7); each lateral struma of abdominal segments 1-8 with chalazae of various sizes of which the setae of two are conspicuous, each about as long as segment or slightly longer. Head setiferous, uniformly pigmented, with few, small, spine-like asperities lateral to each frontal suture.

Material studied: Five specimens from New Mexico.

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1893. Report on Some of the Beneficial and Injurious Insects of California. U. S. Dept. Agr. Ent., Bul. 30:9-33.

A NEW SUBSPECIES OF BUTTERFLY

BY DON B. STALLINGS AND J. R. TURNER

Caldwell, Kansas

While collecting in the vicinity of Folsom in northeast New Mexico, we took a series of a new subspecies of *Strymon ontario* which we describe in this paper. Collecting in this area was of particular interest because nearly all of the species of butterflies that we collected showed basic subspecific differences*, most of which (in our opinion) have not developed sufficiently to merit names at this time.

Strymon ontario violae Stallings and Turner, new subspecies

Resembles *Strymon ontario autolyceus* on the upper surfaces except that the ground color is a dark gray-brown rather than a red-brown. On the upper surfaces of the fore wings the males have four fulvous (orange) spots, while the females have two such spots. The hind wings in both sexes have two (sometimes three) restricted fulvous spots in the anal area. The fulvous spots in both sexes are of a more yellowish color than the fulvous in *autolyceus* and the fulvous in *viola* has a tendency to be faded on the inner side of the spot.

*It being our opinion that one of the basic characters of valid subspecies of Lepidoptera on continental areas is change of ground color.

The males have one short stubby tail tipped with white. The females have two tails tipped with white, the second (top) tail being so short that it hardly merits the title. The tails of *violae* are less developed than in either *autolycus* or *ilivia*.

On the under surfaces the markings of *violae* are similar to *autolycus*. It is the ground color that is distinctive, in that it is gray-black rather than the reddish-brown to black of *autolycus* and *ontario*. At certain angles it appears silvery-gray which was the reason that we first confused specimens in flight with *Strymon melinus*. The gray in the ground color is more dominant in the females.

Violae averages about the same size as *autolycus* and is slightly larger than *ilivia*. The shape of the hind wing is like *autolycus* in not having the sharp outer angle like *ilivia*.

In some respects *violae* appears to be an intergrade between *autolycus* and *ilivia* but the difference in ground color (*ilivia* has a light ground color but it shows the reddish influence of *autolycus*) establishes it as a separate subspecies.

Size: male, expanse 25 mm.; female, expanse 28 mm.

Holotype: Male. FOLSOM, N. MEXICO June 15, 1946. Elevation 5600 ft. Allotype: Female. Same data. Paratypes: 10 males, 12 females, same data, except one female caught at 5700 ft. Type series collected by Mr. and Mrs. Don B. Stallings and sons, Dee and Jack. Named for Viola N. Stallings, wife and sister of the authors, who caught the first specimen. The holotype and allotype will be retained in our collection for the time being. Paratypes will be distributed to various museums and private collections.

For the present the range of this subspecies can only be guessed at. However, it is evident that it does not extend east as far as Shamrock, Texas, where we have collected specimens of *autolycus*. Nor can it be expected as far south as Globe, Arizona, where we have collected *ilivia*.

We have compared these New Mexico specimens with a series of *Strymon ontario ilivia* collected near Globe, Ariz., at 5700 feet and with specimens of typical *ontario* and the subspecies *autolycus* in our collection from: Lancaster, Mineral Wells, Shamrock, Hondo and Palo Pinto, Texas; Cache and Tulsa, Okla.; Eureka and Caldwell, Kansas; St. Louis, Mo.; Quitman, Ark.; Marquette, Ill.; Augusta, Ga.

Our New Mexico specimens were collected in association with *Strymon melinus* and at first we were unable to distinguish the two while in flight.

STUDIES ON NORTH AMERICAN MORDELLIDAE, V¹
(Coleoptera)

BY EUGENE RAY

Chicago, Illinois

This is the fifth of a series of papers dealing with North American members of the family. Two species are described from Arizona, two from Oregon (one also from Kansas), and one each from Tennessee, Michigan and Florida. Notes have been added for ten previously known forms.

MORDELLA QUADRIPUNCTATA (Say)

Anaspis quadripunctata Say, 1824. Journ. Ac. N. S. Phila., 3:276.

One specimen: Methow, Washington, May 3, 1941, on rose buds (M. H. Hatch). This is the first West Coast record for this Eastern species. Previous records indicated its distribution from New York west to Colorado and Manitoba.

MORDELLISTENA WENZELI Liljeblad

Mordellistena wenzeli Liljeblad, 1946. Misc. Publ. Mus. Zool., Univ. Mich., 62:79.

One specimen: Charleston, South Carolina, May 2, 1945, in light trap (R. L. Wenzel). This species has hitherto been known only from Tybee Island, Georgia.

Mordellistena fenderi Ray, new species
(Figs. 1, 15)

Form elongate, moderately narrow, sides subparallel along basal two-thirds of elytra, derm black, front, maxillary palpi, four basal segments of antennae, basal angles of pronotum, a broad humeral vitta that narrows abruptly and ends before middle, legs (except posterior femora) and apical margins of abdominal segments, castaneous, anal style and hypopygium fuscous. Body densely covered with fine, recumbent, flavocinereous pubescence.

Eyes densely covered with short, fine, erect hairs. Antennae slender, filiform, 1.45 mm. long, reaching to base of abdomen, segments 1-2 robust, equal; 3 as long as 2, but much narrower; 4 one-half longer and distinctly broader than 3; 5-10 each as long as 4 but

¹Studies on North American Mordellidae, IV. Pan-Pac. Ent., 22:121, 1946.

broader, sides parallel; 11 oval, one-half longer than 10, sides and apex rounded. Terminal segment of maxillary palpi enlarged, form of a rather broad scalene triangle, inner margin but slightly longer than apical edge, sides and angles rounded.

Pronotum distinctly broader than long (1.16 x .95 mm.), anterior margin and sides rounded, broadest before base, the latter arcuate, midbasal lobe moderately long, rounded. Scutellum small, broad, triangular, rounded at tip.

Elytra more than two and one-half times as long as broad (2.7 x 1 mm.), narrower at base than pronotum, sides subparallel on basal two-thirds, thence broadly rounded to apex, apices individually rounded. Anterior and intermediate tibiae about as long as their tarsi, penultimate segment of the latter slightly broadened. Posterior tibiae with two equal, oblique, parallel ridges (excluding subapical one), each extending half way across outer face; basitarsi with two, second segment with one ridge, all near apex and strongly indicated. Anal style slender, a slight constriction before middle, attenuate to apex, two and one-third times as long as hypopygium (1.15 x .5 mm.).

Length: to apices of elytra, 3.65 mm.; to tip of anal style, 4.8 mm.

Holotype, male, PEAVINE RIDGE near McMinnville, OREGON, August 6, 1945, and allotype, female, type locality, July 29, 1945 (K. M. Fender); holotype in collection of Eugene Ray, allotype in collection of Kenneth M. Fender, to whom this species has been dedicated.

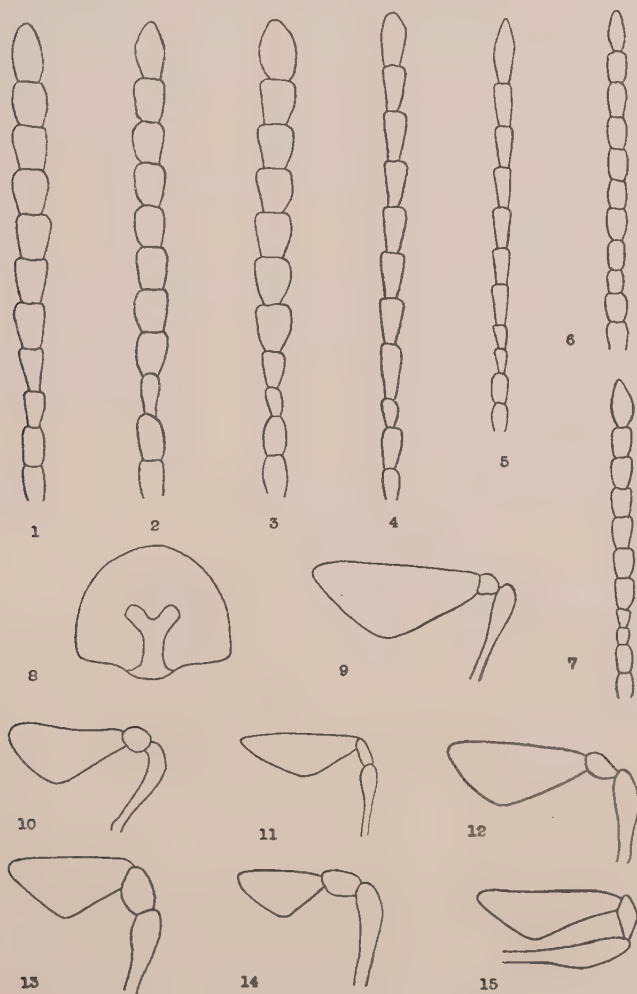
This species is allied to the eastern *limbalis* (Melsheimer)² but may be separated adequately by its different antennae, in which the fourth segment is one-half longer than the third, the

²Proc. Acad. N. S. Phila., 1846, 2:315.

Fig. 1, Antenna of *Mordellistena fenderi* Ray. Fig. 2, Antenna of *Mordellistena malkini* Ray. Fig. 3, Antenna of *Mordellistena arizonensis* Ray. Fig. 4, Antenna of *Mordellistena suturalis* Ray. Fig. 5, Antenna of *Mordellistena pilosella* Ray. Fig. 6, Antenna of *Mordellistena bihirsuta* Ray. Fig. 7, Antenna of *Mordellistena y-notata* Ray. Fig. 8, Pronotum of *Mordellistena y-notata* Ray. Fig. 9, Maxillary palpus of *Mordellistena y-notata* Ray. Fig. 10, Maxillary palpus of *Mordellistena bihirsuta* Ray. Fig. 11, Maxillary palpus of *Mordellistena pilosella* Ray. Fig. 12, Maxillary palpus of *Mordellistena arizonensis* Ray. Fig. 13, Maxillary palpus of *Mordellistena suturalis* Ray. Fig. 14, Maxillary palpus of *Mordellistena malkini* Ray. Fig. 15, Maxillary palpus of *Mordellistena fenderi* Ray.

fourth to tenth being equal in length, with no noticeable narrowing distally, by the triangular terminal segment of the maxillary palpi (in *limbalis* this segment is boat-shaped) and by the difference in the color of the pronotum.

The frontal spot of the male is absent in the female. In the latter sex the broad humeral vitta darkens gradually and ends about one-third from the tip of the elytra.



Mordellistena suturalis Ray, new species

(Figs. 4, 13)

Form, narrow, elongate, sides narrowing, but slightly cuneate. Derm fuscous or fuscopiceous, head fuscous in male with apical half of front fuscobrunneous, entirely fuscobrunneous in female with a dorsal cloud on vertex; maxillary palpi fuscobrunneous, antennae varying from fuscobrunneous at base to fuscopiceous at apex; pronotum fuscous in male, fuscous in female with basal margins and angles fuscobrunneous, the angles broadly so; elytra fuscous in male, fuscous in female with a broad fuscobrunneous vitta covering base, except narrowly along suture and margins and abruptly narrowing one-fourth from base, extending therefrom in a narrow subsutural line to within one-fifth of apex; anterior legs fuscobrunneous in male, legs completely fuscobrunneous in female except for the posterior femora, which are fuscous. Surface densely covered with fine, recumbent pubescence, partaking of ground color, except on light parts, where it is golden.

Head strongly convex, eyes entire, densely covered with short, erect hairs. Antennae 1.06-1.43 mm. long, reaching base of pronotum; segment 4 twice as long as 3 in male, one-half longer in female, and one-half broader in both sexes; 5-10 each slightly broader than 4, but slightly shorter; 11 equal in length to 10, broadest subapically, sides and apex rounded. Terminal segment of maxillary palpi enlarged, form of a scalene triangle, apical edge rounded, intermediate in length between the inner and outer sides.

Pronotum convex, distinctly broader than long (1.06-1.36 x .94-1.21 mm.), apex and sides rounded, basal angles obtuse, base arcuate, midbasal lobe broad, short, but rounded. Scutellum broad, triangular, sides and apex rounded.

Elytra two and-one-third times as long as broad (2.49-3.25 x 1.06-1.36 mm.), sides subcuneate to within one-fifth of apex, thence strongly curved, apices individually rounded. Anterior and intermediate tarsi equal in length to their tibiae. Posterior tibiae with two equal, oblique ridges, each extending across almost one-half width of outer face; basitarsi with three ridges, second segment with two. Anal style slender, acuminate to apex, three times length of hypopygium in male (1.17 x .38 mm.), three and one-half times length of hypopygium in female (1.47 x .42 mm.).

Length: to apices of elytra, 3.43-4.46 mm.; to tip of anal style, 4.64-5.93 mm.

Holotype, male, allotype, female, and two paratypes, both males, GREAT SMOKY MOUNTAINS NATIONAL PARK, GATLINBURG, TENNESSEE, June 13-19, 1942 (H. S. Dybas); holotype and allotype in the collection of Eugene Ray, paratypes in the collection of the Chicago Natural History Museum.

This species is allied to *egregia* Liljeblad³ and may be separated by the broad basal vitta of the elytra, which abruptly narrows one-fourth from base and extends in a narrow sub-sutural line almost to apex, by the shorter antennae with the fourth segment slightly longer than the fifth, by the uniformly fuscopiceous color of the ventral surface, by the shorter, broader maxillary palpi, by the longer, narrower posterior tibiae and by the broader form. Comparisons have been made with the types of *egregia*, as well as with *argenteola* Liljeblad⁴ and *syntaenia* Liljeblad⁵, with which this species is also allied.

Mordellistena bihirsuta Ray, new species

(Figs. 6, 10)

Form moderately slender, narrow, sides subparallel on basal half of elytra, derm black, four basal segments of antennae fuscobrunneous, front, mouthparts, anterior legs and middle femora castaneous to fuscous. Body densely covered with fine, recumbent pubescence, sericeocinereous, except on pronotum and elytra, where it is flavocinereous, with the elytral suture and apex broadly and the apical half of lateral margin narrowly covered with dark pubescence that appears to be purple in certain lights.

Eyes densely covered with short, fine, erect hairs. Antennae 1.1 mm. long, extending to base of pronotum, segments 1-2 robust, equal; 3 distinctly longer but narrower than 4; 5-10 each longer than 3 and one-half broader, subserate; 11 slightly longer than 10, oval, sides and apex rounded. Terminal segment of maxillary palpi enlarged, form of a moderately elongate scalene triangle, distinctly longer than broad, inner and apical margins straight, angles rounded.

Pronotum one-half broader than long (1.26 x .8 mm.), anterior margin and sides broadly rounded, base arcuate, midbasal lobe moderately produced, broad, rounded. Scutellum small, broad, triangular, broadly rounded at tip.

Elytra short, slightly more than twice as long as broad (2.7 x 1.16 mm.), narrower at base than pronotum, broadest at base, sides subparallel on basal half, thence curved to apex, apices individually rounded. Anterior and intermediate tibiae shorter than their tarsi, the latter filiform, penultimate segment shortest. Posterior tibiae with two equal, oblique, parallel ridges (excluding subapical one), each short, extending no more than one-third distance across outer face; basitarsi with three, second segment with two short ridges. Anal style short, robust, attenuate to apex, but twice length of hypopygium (1.16 x .58 mm.).

Length: to apices of elytra, 3.5 mm.; to tip of anal style, 4.66 mm.

³Misc. Publ. Mus. Zool., Univ. Mich., 1946, 62:107.

⁴Misc. Publ. Mus. Zool., Univ. Mich., 1946, 62:104.

⁵Can. Ent., 1921, 53:184.

Holotype, male, MALHEUR LAKE, OREGON, June 10, 1940 (K. M. Fender); allotype, female, BOARDMAN, OREGON, June 26, 1941 (K. M. Fender); two paratypes, OTHELLO, WASHINGTON, June 18, 1932 (M. H. Hatch); one paratype, TOPEKA, KANSAS, June 10, 1941 (H. S. Dybas); holotype in the collection of Eugene Ray; allotype in the collection of Kenneth M. Fender; paratypes in the collection of the Chicago Natural History Museum, Melville H. Hatch and Eugene Ray.

This species is closest to *syntaenia* Liljeblad⁶ and has been compared with the type of the latter. It differs in its broader form, in the broad, laterally placed yellowish vitta on the elytra, which in *syntaenia* is double and medially placed on each elytron, by the antennae, which have the third segment longer than the fourth, and by the shorter anal style.

Mordellistena arizonensis Ray, new species

(Figs. 3, 12)

Form narrow, elongate, sides subparallel to middle of elytra. Derm black, except for a narrow, rufocastaneous line along caudal margins of abdominal segments, clypeus, labrum and mesal half of mandibles rufocastaneous. Surface densely covered with fine, recumbent pubescence, partaking of ground color, except for the following whitish areas: head, pronotum, scutellum, base and basal fifth of elytral margins broadly, single scattered hairs elsewhere on disc, meso- and metasternum and basal halves of abdominal segments.

Head strongly convex, but little narrower than pronotum; eyes entire, densely covered with fine, erect hairs. Antennae short, robust, 1.1 mm. long, extending only to basal third of pronotum; segments 1-2 large, equal; 3-4 equal in length, 4 distinctly broader than 3; 5-10 each one-third longer and broader than 4, subseriate, each broadest subapically, mesal edges rounded, lateral edges straight; 11 distinctly longer than 10, sides straight, angles obtuse. Terminal segment of maxillary palpi enlarged, form of a broad scalene triangle, apical edge shortest, lateral margin almost straight, angles rounded.

Pronotum moderately rounded, distinctly broader than long (1.21 x 1.02 mm.), completely and finely margined, apex, sides and basal angles rounded, the latter obtuse, base arcuate, midbasal lobe short, broad, rounded. Scutellum moderately large, broadly triangular, sides and apex rounded.

Elytra narrow, elongate, two and one-half times as long as broad

⁶Can. Ent., 1921, 53:184.

(3.02 x 1.21 mm.), sides subparallel on basal half, thence strongly curved caudad, apices individually rounded. Anterior and intermediate tarsi filiform, as long as their tibiae, penultimate segment shortest. Posterior tibiae with two short, oblique, equal, parallel ridges near the tip (excluding subapical one); basitarsi with four oblique ridges, second segment with two. Anal style but twice length of hypopygium (1.17 x .64 mm.), robust, acuminate to apex, the latter truncate.

Length: to apices of elytra, 4.04 mm.; to tip of anal style, 5.21 mm.

Holotype, female, HUACHUCA MOUNTAINS, ARIZONA, August 18, 1938 (J. N. Knull); in the collection of Ohio State University.

This species is allied to both *pullata* Liljeblad⁷ and *nigella* Liljeblad⁸. Comparison with the types of these two species reveals the following differences: a larger size, broader form, broader terminal segment of the maxillary palpi, the whitish color of the body pubescence, particularly on the meso- and metasternum and basal margins of the abdominal segments, the bicolored elytral pubescence with single, shining, whitish hairs among others of dermal color, except along base and basal half of lateral margins, where they are more numerous but not dense enough to be considered a fascia, and the shorter antennae, which reach only to basal third of pronotum.

MORDELLISTENA EGREGIA Liljeblad

Mordellistena egregia Liljeblad, Misc. Publ. Mus. Zool., Univ. Mich., 1946, 62:107.

One specimen: Seaview, Washington, July 25, 1932. This species was described from two specimens taken in Mariposa County, California.

Mordellistena pilosella Ray, new species

(Figs. 5, 11)

Form narrow, linear, sides subparallel. Derm black; labrum, palpi, anterior and intermediate legs and six basal segments of antennae flavocastaneous, intermediate femora and tibiae darker, antennal segments seven to eleven fuscous. Surface covered with fine, recumbent pubescence, sericeocinereous everywhere, except on light areas, where it has a yellowish tinge.

Head strongly convex, almost as broad as the pronotum, eyes entire, densely covered with fine, erect hairs. Antennae 1.51 mm.

⁷Misc. Publ. Mus. Zool., Univ. Mich., 1946, 62:116.

⁸Ibid., 62:116.

long, reaching beyond base of pronotum; segments 1-2 large, equal; 3-4 short, equal; 5-10 equal, each two-thirds longer and slightly broader than 4, not, however, serrate, but slightly broadened to apex; 11 one-half longer than 10, flattened, broadest at apical third, sides and corners rounded. Terminal segment of maxillary palpi enlarged, moderately robust, with the form of a scalene triangle, apical edge distinctly longer than inner margin, sides and angles rounded.

Pronotum convex, slightly broader than long (.72 x .68 mm.), completely and finely margined, apex and sides rounded, basal angles obtuse, base arcuate, midbasal lobe broad, short, truncate. Scutellum large, triangular, sides rounded, apical angle broadly so.

Elytra narrow, elongate, two and seven-tenths times as long as broad (1.96 x .72 mm.), sides subparallel to within a fourth of apex, thence strongly curved, apices individually rounded. Anterior and intermediate tarsi distinctly longer than their tibiae, subfiliform, penultimate segment slightly broadened at apex. Posterior tibiae with two oblique, parallel ridges, anterior one extending entirely across outer face; basitarsi with three oblique ridges, second segment with two. Anal style distinctly more than twice length of hypopygium (.91 x .41 mm.), slender, acuminate from base to apex.

Length: to apices of elytra, 2.64 mm.; to tip of anal style, 3.55 mm.

Holotype, male, PATAGONIA MOUNTAINS, ARIZONA, August 20, 1940 (D. J. and J. N. Knull); in the collection of Ohio State University.

This species is most closely allied to *blatchleyi* Liljeblad⁹ and may be separated by the more elongate form, larger size, longer pronotum, larger, more rounded scutellum, shorter anal style, the castaneous anterior and intermediate legs, with their tarsi longer than the tibiae, the longer, bicolored antennae, with the six basal segments flavocastaneous and the remainder fuscous and the difference in the relative lengths of these segments, the fifth being two-thirds longer than the fourth.

MORDELLISTENA SUBFUCUS Liljeblad

Mordellistena subfucus Liljeblad, Misc. Publ. Mus. Zool., Univ. Mich., 1946, 62:134.

Four specimens: Forest Hill, Rapides Parish, Louisiana, September.

⁹Misc. Publ. Mus. Zool., Univ. Mich., 1946, 62:133.

MORDELLISTENA TESTACEA Blatchley

Mordellistena testacea Blatchley, Col. Ind., 1910, 1321.

One specimen: Forest Hill, Rapides Parish, Louisiana, September 17-21, 1945, light trap (R. L. Wenzel). This is an extreme southern record, the species having hitherto been recorded only from Indiana.

MORDELLISTENA NUNENMACHERI Liljeblad

Mordellistena nunenmacheri Liljeblad, Can. Ent., 1918, 50:157.

Three specimens: one, Virden, Washington, May 4, 1935 (Hatch-Wilson) and two, Metiolus River, Oregon, June 1, 1936 (H. Lanphere). This species is now known to be found in the three Pacific Coast States.

Mordellistena y-notata Ray, new species

(Figs. 7, 8, 9)

Form narrow, elongate, subparallel, but slightly subcuneate. Derm black, head castaneous, vertex black; antennae black; pronotum castaneous, basal margin narrowly black, a fuscous, Y-shaped spot on posterior half of disc, the stem at the midbasal lobe and the arms extending to middle of disc. Basal two-thirds of anterior and intermediate femora castaneous, remainder black. Surface densely covered with fine, recumbent pubescence, partaking of ground color, except on head and pronotum, where it is yellowish and on ventral surface, where it is whitish.

Head strongly convex, eyes entire, densely covered with fine, erect hairs. Antenna 1.06 mm. long, reaching to middle of pronotum; segments 3-4 equal in length, the latter slightly broader; 5-10 each one-half longer and broader than 4, flattened, subserrate, broadest at apex; 11 one-third longer than 10, broadest subbasally, sides and apex rounded. Terminal segment of maxillary palpi enlarged, form of a broad isosceles triangle, sides distinctly rounded.

Pronotum convex, broader than long (1.09 x .89 mm.), apex and sides rounded, basal angles obtuse, base arcuate, midbasal lobe broad, long, strongly rounded. Scutellum small, triangular, sides and apex rounded.

Ellytra narrow, two and six-tenths times as long as broad (2.83 x 1.09 mm.), sides subparallel to beyond middle, thence strongly curved, apices individually rounded. Anterior and intermediate tarsi filiform, as long as their tibiae. Posterior tibiae with three

equal, oblique ridges, each extending about one-third across outer face; basitarsi with three ridges, second segment with two. Anal style twice length of hypopygium (1.09 x .53 mm.), broad on basal half, narrow and acuminate from middle to apex.

Length: to apices of elytra, 3.81 mm.; to tip of anal style, 4.9 mm.

Holotype, female, DECATUR, MICHIGAN, July 18, 1942 (E. Ray); in the collection of Eugene Ray.

This species is most closely allied to *tantula* Liljeblad¹⁰ and may be distinguished by the presence of a Y-shaped, fuscous area on the basal half of pronotum, the castaneous head, the black antennae, the bicolored legs and the peculiar antennae, which have segments three and four equal, five to ten much broadened and flattened and almost twice as wide as four. In *tantula* four is as long as two and three together, five to ten are not flattened and are not much broader than four.

MORDELLISTENA AMBUSTA LeConte

Mordellistena ambusta LeConte, Proc. Acad. N. S. Phila., 1862, 14:50.

One specimen: Seattle, Washington, July 16, 1927 (T. Kincaid). This is the first West Coast record for this Eastern species.

MORDELLISTENA CONFORMIS Smith

Mordellistena conformis Smith, Bull. Brook. Ent. Soc., 1883, 6:4.

Four specimens: Forest Hill, Rapides Parish, Louisiana, August 10-September 7, 1945, light trap (R. L. Wenzel). This species has hitherto been recorded only from Texas.

Mordellistena malkini Ray, new species (Figs. 2, 14)

Form narrow, elongate, sides subparallel on basal half of elytra. Derm black, except two basal segments of antennae, which are fuscocastaneous. Surface densely covered with fine, recumbent pubescence, cinereous everywhere, except on elytra, where it is mixed with black.

Head convex, distinctly narrower than pronotum; eyes entire, densely covered with short, erect hairs. Antennae 1.38 mm. long,

¹⁰Misc. Publ. Mus. Zool., Univ. Mich., 1946, 62:159.

reaching base of pronotum; segments 1-2 large, equal; 3-4 equal in length, the latter distinctly broader; 5-10 somewhat flattened, each one-fourth longer and slightly broader than 4; 11 one-third longer than 10, broadest postmedially, sides and angles rounded. Terminal segment of maxillary palpi enlarged, form of a broad, scalene triangle, mesal margin shortest, sides and angles rounded.

Pronotum as long as broad (1.32 mm.), finely but distinctly margined, apex and sides strongly rounded, basal angles right angles, base arcuate, midbasal lobe broad, short, rounded. Scutellum small, broad, subtriangular, sides and apex rounded.

Elytra elongate, narrow, two and six-tenths times as long as broad (3.4 x 1.32 mm.), sides parallel on basal half, thence broadly rounded to apex, apices individually rounded. Anterior and intermediate tarsi longer than their tibiae, penultimate segment shortest, distinctly broader than preceding segment and emarginate on apical margin. Posterior tibiae with three oblique, parallel ridges, middle one extending completely across outer face, others extending less than half this distance; basitarsi with five oblique ridges, second segment with three. Anal style elongate, more than three times length of hypopygium (2.14 x .7 mm.), abruptly narrowing one-third from base, thence narrow and attenuate to apex, the latter acute.

Length: to apices of elytra, 4.72 mm.; to tip of anal style, 6.86 mm.

Holotype, male, allotype, female, and a paratype, female, TARPON SPRINGS, FLORIDA, April 18, 1943 (B. Malkin); holotype and allotype in the collection of Eugene Ray; paratype in the collection of Borys Malkin, to whom this striking species is dedicated.

This species is allied to *husseyi* Lilejblad¹¹, described from Michigan, but may immediately be separated by the narrower form, larger size, the larger number of ridges on the posterior tarsi, the longer anal style, the black palpi and anterior femora and the narrower terminal segment of the maxillary palpi.

NAUCLES TIBIALIS Champion

Naucles tibialis Champion, Biol. Centr. Amer. Col., 1891, 4, 2:257.

One specimen: Forest Hill, Rapides Parish, Louisiana, September 24-29, 1945, light trap (R. L. Wenzel). This species has hitherto been recorded only from Guatemala and California.

¹¹Misc. Publ. Mus. Zool., Univ. Mich., 1946, 62:176.

REDESCRIPTION OF *AGENIOIDEUS HUMILIS* (CRESSON)
WITH NOTES ON ITS BIOLOGY
(Hymenoptera, Pompilidae)

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The recent discovery of *Agenioideus humilis* (Cresson) on Mt. Diablo, Contra Costa County, California, by J. W. MacSwain and G. E. Bohart of the University of California is of particular interest because it sheds some light on the biology of the species. In addition, the discovery places this widely distributed species for the first time on our California faunal list.

Humilis was described by Cresson (1867:91) on the basis of a single female collected in New York (State?). The male was known to Ashmead (1902:85) when he erected the monobasic genus, *Agenioideus*, since characters of both sexes were enumerated in the description. However, Viereck (1906:304), apparently unaware of Ashmead's treatment of the species, recorded a male from New Haven, Connecticut which he believed constituted the first record of the male and characterized it as such.

The four male and two female specimens which form the basis for the following redescription of the species were reared from pupal cases collected at Rock City, Mt. Diablo, California by MacSwain and Bohart on January 12, 1947. The pupal cases were found singly in pulverized sandstone detritus which had accumulated in small, weathered recesses at the base of a cliff. Of the eleven pupal cases uncovered and brought into the laboratory for rearing, six yielded adult wasps by early April, one pupal case was found to be parasitized by a bombyliid larva, another by a mutillid larva, and the remaining three were empty.

AGENIOIDEUS HUMILIS (CRESSON)

Pompilus humilis Cresson, 1867, Trans. Amer. Ent. Soc., 1:91, ♀.

Agenioideus humilis, Ashmead, 1902, Can. Ent., 34:85, ♂ ♀.

Anoplius humilis, Viereck, 1906, Ent. News, 17:304, ♂.

Sericopompilus humilis, Banks, 1911, Jour. N. Y. Ent. Soc., 19:229.

Agenoideus [sic!] *humilis*, Banks, 1917, Bull. Mus. Comp. Zool., Harvard College, 61:107; Banks, 1919, Bull. Mus. Comp. Zool., Harvard College, 63:239.

Male. Length, 4-6 mm. Head black, distinctly wider than thorax, clothed with numerous recumbent, silvery, pubescent hairs on face and clypeus and erect, silvery, pubescent hairs on vertex and hind margins of head; vertex sculptured with a few scattered punctures; eyes large, reaching to posterior margin of head, slightly convergent above; ocelli prominent; posterior ocelli much closer to inner eye margins than to each other; anterior ocellus about one and a quarter times diameter of a posterior ocellus; face medio-longitudinally traversed by a weakly impressed line extending from anterior ocellus to antennal bases; antennae black, clothed densely with minute, erect, black hairs; clypeus broadly and evenly rounded, swollen medially, anterior margin in some with a few scattered punctures; mandibles black shading to dark amber on apex (variable), clothed exteriorly with a few, erect, rather stout, black hairs; malar space between bases of mandibles and eyes distinct. *Thorax* black (pruinose in certain lights), clothed with recumbent, silvery, pubescent hairs particularly on propodeum; posterior margin of pronotum angulate; propodeal surface scarcely arched posteriorly; legs black, except for a dull white spot on upper posterior surface of each hind tibia; claws pale brown, unidentate within; intermediate and posterior tibiae armed with a few short, stout spines; inner posterior tibial spur nearly three-fourths length of basitarsus. *Wings* whitish-hyaline, refulgent with green, copper and rose violet iridescence (in certain lights), clothed with numerous, minute, black hairs; fore wing bifasciately fumose, outer fascia in form of an exterior marginal band, inner fascia more diffuse occupying area immediately below stigma; second submarginal cell nearly rectangular, first recurrent vein meeting the cell a little beyond the middle; third submarginal cell trapezoidal, second recurrent vein meeting cell about two-thirds from the tip; marginal cell acute at apex; hind wing with exterior marginal band similar to that of fore wing, inner fascia absent. *Abdomen* black (pruinose in certain lights) with a dull white spot on terminal tergite (though absent in some), subpetiolate, arched posteriorly, laterally compressed. *Subgenital plate* brownish-black, spatulate, attenuated basally, median portion elevated, forming a rather broad medio-longitudinal, carinate keel which when viewed in profile describes an arc extending from basal portion of plate nearly to apex; apical margin of plate rounded, armed with a fringe of rather long, stout, black bristles.

Female. Length, 4 mm. Similar to male in coloration and vestiture, though dull white markings on hind tibia and on terminal abdominal tergite obscure or missing. Anterior tarsal comb composed of five rather long, stout spines, about equal in length except for most distal spine which is about three-fourths the length of the others. Third antennal segment fully twice as long as scape, instead

of being subequal as in the male. Tip of abdomen noticeably clothed with short, erect, ashy-white hairs (black in some lights).

Pupal case cigar shaped, smooth, papery, pale brown, except for smaller end which is black owing to the presence of a hard packed, grayish black deposit within that end of the case. Length, 4-6 mm. Emergence is effected by a complete excision of the large end of the case.

Type locality. New York.

Recorded distribution. New Haven, Connecticut, 1 ♂, June 9, 1905 (Viereck, 1906). Revelstoke, Selkirk Mts., British Columbia, July 8-13 (Banks, 1919). Banks (1919:239) states, "But one species known which occurs across the northern part of North America."

New records. Mt. Diablo, Contra Costa County, California, 4 ♂ ♂, 2 ♀ ♀, reared from pupae collected on January 12, 1947, by MacSwain and Bohart.

Humilis is readily recognized by the bifasciate character of the fore wing, the dull white marking on each hind tibia, and the nature and color of the vestiture.

A SENSILLUM IN *CARPOPHILUS* AND *HAPTONCUS* (Coleoptera, Nitidulidae)

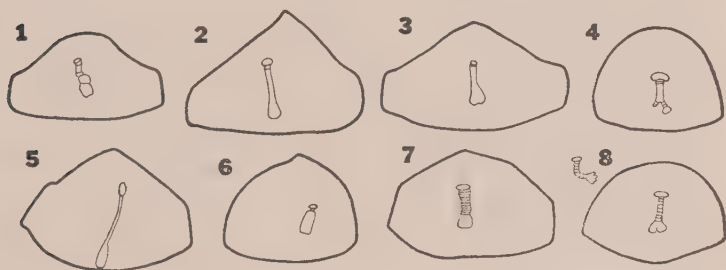
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The chitinous invagination of the terminal segment of the antennae of certain Nitidulidae reported herein should properly and descriptively be referred to as a *sensillum ampulaceum*. The organ has been found in only two genera, *Haptoncus* and *Carpophilus*, although several genera in this family have been examined. It was clearly observed in all species of these genera examined with the single exception of *C. pallipennis* (Say.)

This sensillum was first noticed in slide material prepared during the description of a new species of *Haptoncus*. Although it can be observed with fairly low magnification, it is necessary to mount the segment upon a slide and use transmitted light because the organ is enclosed within the segment.

In the Nitidulidae the antennae are eleven segmented with a three segmented somewhat flattened club. The terminal segment is

generally roughly pentagonal in outline and often under low magnification has the appearance of two articulated segments. Upon the lower surface of the segment at the line of this apparent fusion is the circular or oval opening of the sensillum. The main part or body of the organ rests inside of the segment and is extended toward the base of the antennae. The structure is chitinous and might easily have been formed during the evolution of this antenal segment by the telescoping of a primitive twelfth segment into the eleventh.



Figures show the outline of the terminal segment and its sensillum ampulaceum. 1, *Carpophilus* sp.; 2, *Carpophilus discoideus* Lec.; 3, *Carpophilus humeralis* (Fabr.); 4, *Haptoncus ochraceus* Er.; 5, *Carpophilus brachypterus* (Say); 6, *Carpophilus antiquus* Melsh.; 7, *Haptoncus luteolus* (Er.); 8, *Haptoncus californicus* Gillogly, inset of an aberrant form of the sensillum in *H. californicus*.

In different species the shape and appearance of the sensillum may vary greatly. It sometimes extends for nearly two-thirds of the length of the segment as in *Carpophilus brachypterus* (Say) (fig. 5) or for less than one-fourth of that distance as in *C. antiquus* Melsh. (fig. 6). Although it is usually a simple pear-shaped flask, it may be clubbed, convoluted, or even divided at the base as in *Haptoncus ochraceus* Er. (fig. 4). The neck of the flask is often ringed or reticulate for all or part of its length and these markings sometimes extend over the entire surface of the sensillum. This variation in the organ is often greatest between closely allied species and is very helpful in such cases as a specific character. *Haptoncus luteolus* (Er.) (fig. 7) and *H. ochraceus* Er. (fig. 4) are very similar in appearance but the sensilla quickly and definitely separate them. *Carpophilus humeralis* (Fabr.) (fig. 3) and *Carpophilus* sp. (fig. 1) can scarcely be separated on the basis of existing descrip-

tions but the sensillum of the latter is so remarkably different from the former as well as from all other species examined as to be definitely recognizable without examining the rest of the insect. In *Haptoncus californicus* Gillogly one antenna of one specimen had the sensillum bent to form a right angle. An inset of this sensillum is included although it is not typical of this or any other species examined. While this new character will be very helpful in many cases it must be remembered that in some species the sensilla are very similar in shape and appearance and it would be difficult, if not impossible, to identify all species merely by this character alone.

The genus *Haptoncus* was first placed in the Nitidulariae by Erichson (1843) when he described the species *Haptoncus (Epuraea) luteolus* (Er.); then Murray (1864) and Sharp (1891) placed the genus in Carpophilidae; and finally Parsons (1943) returned the genus to the Nitidulinae. It appears to me that there can no longer be any doubt as to the true position of this genus because the new character discussed in this paper appears only in the two genera *Carpophilus* and *Haptoncus*. Moreover, as Murray (1864) and Sharp (1891) have each separately commented, the genus actually keys out to the Carpophilinae in fresh material and the terminal abdominal segments only become retracted in dried specimens. Sharp (1891) writes, "no species of *Epuraea* has the elytra so short as *Haptoncus*" and adds, "that no good line of demarcation between the two groups, as at present defined, exists." I submit that the presence of the antennal sensillum in *Haptoncus* and its absence in *Epuraea* and the other Nitidulinae, indicates that the former genus is allied to *Carpophilus* and the other Carpophilinae.

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A NEW HOLLYHOCK APHID

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A maroon-red to reddish-brown aphid of the genus *Macrosiphum* has been observed to infest hollyhock, *Althaea rosea*, each season for a number of years, at Logan and elsewhere in Utah. Usually by late May the aphid had become so abundant as to be damaging. Some decrease in numbers ordinarily occurred during August; the aphid again became extremely abundant during early September and remained in damaging abundance until frosts had destroyed the foliage. Most of the individuals were observed to feed head downward, beneath the surface of leaves, on petioles, stems and beneath ovaries of flowers. They sometimes occurred from the apex of the plant to within an inch or two of the ground and were usually most abundant on the upper third. This species has been collected in injurious abundance by the writer, from Cedar City, in southern Utah, to as far north as Lethbridge, Alberta, Canada. When encountered, usually it has been present on at least some plants in conspicuous abundance.

The writer is indebted to Professors E. O. Essig and M. A. Palmer for their opinions concerning this pest, and to Merlin W. Allen who in correspondence called attention to its undescribed condition.

Macrosiphum eoessigi Knowlton, new species

General body color of living material, reddish-brown to maroon-red (occasionally a slight greenish or brighter red). Head, antennae except for small area at base of III, cornicles, cauda, anal plate, and most of legs beyond middle of tibiae black, or at least fuscous. Most dorsal abdominal hairs have a distinct blackish area surrounding the base; these sometimes tend to form a broken band across dorsum of segment preceding cauda. The dark areas become faded or lost when specimens are cleared too long in caustic. A dark area usually occurs behind each black cornicle. Cuticula of thorax and abdomen have tendency to be somewhat rugulose; minute spinose pattern often occurs along many of the ventral abdominal lines in apterous forms, especially noticeable in males. Ocular tubercles present; antennal tubercles prominent. Hairs on vertex moderately prominent and flattened at apex.

Stem mothers or fundatrices: Body 2.24 to 3.15 mm. long and 1.5

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to 1.62 across abdomen; antennae 3.32 to 4.19 mm. long; antennal III, .86 to .98 mm. long with 3 to 10 rounded sensoria of various sizes, mostly in irregular line on basal half of segment; IV, .65 to .9; V, .58 to .68; VI, .17 to .2 plus .97 to 1.11; rostral IV + V slenderly obtuse, .174 to .188, usually reaching abdomen; hind tibiae 1.98 to 2.48; hind tarsi .17 to .19; cornicles strong, .95 to 1.25 long with distal .26 to .32 mm. reticulated; total length of cauda, .54 to .57 long with 4 to 7 lateral hairs on each side, usually conical (rarely with slight constriction before base).

Alate: Winged females become abundant with maturity of the second generation, decreasing in number by mid-summer and scarce in fall. Spring alates have body 2.3 to 3.1 mm. long; antennae 3.66 to 4.26; antennal III, .83 to .91 with 8 to 19 sensoria; IV, .78 to .9; V, .65 to .74; VI, .17 to .19 plus 1.02 to 1.18; rostral IV + V, .18 to .19, usually reaches abdomen; hind tibiae 2.24 to 2.51; hind tarsi .18 to .19; cornicles black, .95 to 1.1 with distal .27 to .34 mm. reticulated; cauda .45 to .5 long with 4 to 8 lateral hairs, somewhat conical but not sharp at tip.

Aptera: Spring and summer aptera resemble fundatrices; body 3 to 3.25 mm. long; filament of antennal VI, .99 to 1.21; hind tibiae 2.33 to 2.81. Small fall sexuparae, which occur together with larger aptera, have body about 2.12 to 2.37 mm. long; antennae 2.78 to 3.12; antennal III, .64 to .68 with 1 to 5 sensoria; IV, .53 to .54; V, .47 to .49; VI, .14 plus .90; cornicles .72 to .85 with distal .17 to .2 reticulated; cauda .38 to .41 mm. long.

Males: Small apterous males occur during late September and October at Logan. Body 1.67 to 2.02; antennae 2.42 to 2.95; antennal III, .54 to .695 with 25 to 43 sensoria; IV, .49 to .6 with 13 to 25 sensoria; V, .43 to .57 with 9 to 15 secondary sensoria; VI, .1 to .14 plus .63 to .87 mm. long; rostral IV + V, .158, slenderly obtuse, reaching abdomen; hind tibiae 1.43 to 1.77; hind tarsi .14 to .16; cornicles .39 to .52 with distal .06 to .08 reticulated; cauda .19 to .252 mm. long.

Oviparae: Body 2.21 to 2.33 mm. long; antennae 2.56; antennal III, .68 to .77 with 1 to 8 sensoria; IV, .63 to .66; V, .52 to .56; VI, .15 to .17 plus .84; rostral IV + V, .16; hind tibiae, 1.78 to 1.91 with basal half somewhat swollen and armed with about 20 to 35 small rounded sensoria; hind tarsi .16 to .173; cornicles .73 to .82 with distal .11 to .22 reticulated; cauda .33 to .4 with 4 to 7 lateral hairs, usually without constriction before base.

Type: In the collection of the writer, the slide containing four alates, collected at LOGAN, UTAH, May 25, 1946, G. F. Knowlton. Paratypes in the collection of Utah Agricultural Experiment Station, Professors E. O. Essig and M. A. Palmer, Doctors C. F. Smith and A. N. Tissot, and in the U. S. National Museum. Approximately 175 slides were available for the above study, containing more than 1000 mature individuals.

Taxonomy: Alate *Macrosiphum eoessigi* n. sp. runs to *M. kiowanepus* (Hottes) in Gillette and Palmer's key (Ann. Ent. Soc. Amer. 27:169, 1934) from which it differs in body having more of a maroon-red color and lacking pruinose covering, in having larger body and shorter antennae and cornicles. The hind tibiae of the *eoessigi* oviparae contain fewer and smaller sensoria than other *Macrosiphum* species infesting plants of the Mallow family.

Collections: Described chiefly from material collected at Logan, Utah, throughout 1946 and in fall of 1945. Type locality, LOGAN, UTAH. Collections include: at Logan, Utah, October 16 and 17, 1945 (Knowlton), oviparae and males; September 9, 1945 (M. W. Allen—these in the E. O. Essig collection); May 1, 4, 6, 10, 12, 13, 15, 16, 25, July 14, August 30, September 4, 12, 15, 17, 18, October 22, November 8, 17, 1946 (Knowlton); May 24, 1946 (Knowlton and W. P. Nye). Collected elsewhere in Utah, during 1946 at: Farmington, May 16; Hyde Park, May 13 and October 22; Murray, June 28; Provo, July 16 and September 12; Aurora, July 5; Joseph, July 14; Cedar City, July 3 (Knowlton). Previous to 1945 specimens were taken at Salt Lake City, June 21, 1925, (Knowlton) and July 7, 1936 (C. F. Smith and P. T. Rigby); Ogden, July 31, 1935 (C. F. Smith); American Fork, June 29, 1936 (Knowlton), and Logan July 2, 1933 (Knowlton), in Utah. Collections also were made at Hollister, Idaho, July 27, 1936 (Knowlton); Franklin, Idaho, June 30, 1946 (Knowlton); Twin Falls, Idaho, July 20, 1946 (K. E. Evans); St. Marys, Montana, July 28, 1946 (Knowlton); Lethbridge, Alberta, Canada, July 26 and 27, 1946 (Knowlton); and Waterton National Park, Alberta, Canada, July 23, 1946 (Knowlton), all collected from common garden hollyhock.

Biological notes: Numerous reddish *M. eoessigi* nymphs were found on hollyhock at Logan during April of 1946. The first mature stem mothers appeared about May 1st. By May 6, numerous mature fundatrices and nymphs were present on apical growth and leaves. Parasitized individuals were found on the writer's back yard hollyhock plants, from May 10 until late October when frosts destroyed most of the leaves; some aphids survived until late November on leaves protected from freezing by snow and other cover. On May 10, a mature female *Nabis alternatus* Parsh. was observed feeding on a mature *M. eoessigi* female, which it killed. Two-spotted ladybird beetles also were

present on the same plant; this beetle later fed on an aphid. The first alate *eoessigi* were collected at Logan on May 13, 1946, and were fairly numerous for the next three weeks. At this time, 3 *Hippodamia convergens* Guerin were observed to feed on this aphid, one of them for approximately 12 minutes, while mating. On May 25, a mature *Anthocoris melanocerus* Reuter was observed at Logan, feeding on a nymph on the lower surface of a leaf. At Logan, Provo, Cedar City, and Lethbridge, *Deraeocoris brevis* Uhler were abundant on infested hollyhocks, where they fed on *eoessigi*. Other predatism was observed by syrphid larvae, adult and larval *Chrysopa*, and by other species of ladybird beetles and larvae. Such seemed sufficient to account for much of the seasonal reduction observed in these aphids during hot weather.

NATIVE HOSTS OF THE MEXICAN CHICKEN BUG,
HAEMATOSIPHON INODORA (DUGÉS)
(Hemiptera, Cimicidae)

BY ROBERT L. USINGER
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This rather common pest of poultry in the southwestern United States and Mexico has never been recorded from a native host. Since the bug is evidently native to this section of the Western Hemisphere and since the chicken is not, the source or native host of the bugs has long been a matter for speculation.

I am now able to record a fine series of this species from a nest cave of the California Condor, *Gymnogyps californianus* (Shaw) in Ventura County, California, Sept. 16, 1939, collected by A. H. Miller and C. B. Koford. Records are more numerous from the nests of owls as follows: Many nymphs and one adult male, Caliente Cr., 25 miles S. E. of Bakersfield, California, May 18, 1941, G. E. Bohart collector; Several specimens, Corona, California, in an abandoned tunnel formerly inhabited by owls, April 25, 1939, L. E. Wilson collector, sent by R. C. Dickson; Many specimens in two lots, Freedom, Oklahoma, alt. 3000 ft., October 31, 1940, Bubordorf and Howell, Great horned owl, *Bubo virginianus* (Gmelin).

Chickens might easily become infested from these birds of prey but the occurrence of related genera of Cimicids (e.g. *Hesperocimex*, *Cimexopsis* and *Synxenoderus*) on swifts and martins suggests that a passerine host may yet be found for *Haematosiphon* from which it may be picked up by birds of prey.

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THREE NEW PSYLLIDS FROM COSTA RICA (Psyllidae: Homoptera)

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The three previously undescribed species of psyllids treated here are from a small group of Central American specimens borrowed from the United States National Museum some time ago. All three species belong to the subfamily Psyllinae.

Psylla bipartita Tuthill, new species (Figs. 1, 1a, 2, 3)

Length to tip of folded wings, 2.5 mm.

Color: Uniformly yellowish green. Antennae dark. Membrane of forewings yellow.

Structure: Head small, narrower than thorax, strongly deflexed, nearly vertical. Vertex concave posteriorly, bulging anteriorly over median ocellus. Genal processes 0.66 as long as vertex, blunt, slightly separated, with numerous large setae. Antennae 2.5 to 3 times as long as width of head. Thorax strongly arched. Pronotum nearly vertical, long. Forewings 2.5 times as long as wide, broadly rounded apically; prominent setae on costa, Rs slightly sinuate, pterostigma short, broad. Hind tibiae with small basal spur.

Male proctiger flask shaped, flexed caudad in apical third. Forceps bipartite, lateral lobe spatulate, in lateral view sharply bent cephalad near base, parallel-sided to rounded apex, inner lobes arising near base, slender, sharply incurved apically, sharp apically, longer than lateral lobes. Female genital segment 0.5 as long as rest of abdomen; dorsal valve sinuate to attenuate spinose apex; ventral valve shorter than dorsal, deep narrow notch at apex.

Holotype, male, no. 58220, United States National Museum, allotype, female, 7 male and 5 female paratypes collected at PASO ANCHO DE SAN SEBASTIAN, COSTA RICA, on *Inga laurina* Willd., December 1, 1935, by C. H. Ballou. Holotype, allotype and paratypes in United States National Museum, paratypes in author's collection.

This species is quite typical of the genus in general appearance, having somewhat the facies of *P. striata* Patch but is dis-

tinct from all previously described species known to the author in the peculiar male genitalia.

Psylla multiplex Tuthill, new species

(Figs. 4, 5)

Length to tip of folded wings, 3 mm.

Color: Unicolorous, yellow. Wings hyaline. Veins of forewings yellow.

Structure: Head short, narrower than thorax, strongly deflexed. Vertex broad, slightly emarginate on caudal margin, strongly bulging anteriorly, with numerous short heavy setae. Genal processes 0.5 as long as vertex, blunt, strongly divergent. (Antennae broken on unique specimen at hand). Eyes large, prominent. Thorax strongly arched. Pronotum strongly inclined, nearly vertical anteriorly, setate. Forewings 2.5 times as long as wide, broadly rounded apically, costa sparsely setate toward base, Rs slightly sinuate, pterostigma very small, marginal cells large. Hind tibiae with small basal spur.

Male proctiger straight, narrowed in apical third. Forceps short, covered with long slender setae, bilobed; outer lobe broad and flattened, in lateral view broad, cephalic margin straight, caudal margin rounded, apex black, sharply bent mesad, second black projection below apex; inner lobe very flat, broad, twisted mesad apically to sharp tip, caudal and apical margins black.

Holotype, male, no. 58221, United States National Museum, VILLA QUESADA, SAN CARLOS REGION, COSTA RICA, taken from *Crotalaria retusa* L., March 26, 1934, by C. H. Ballou.

This species is similar to *P. bipartita* but is somewhat larger, the genal processes are markedly shorter and more divergent and the male genitalia are distinctive.

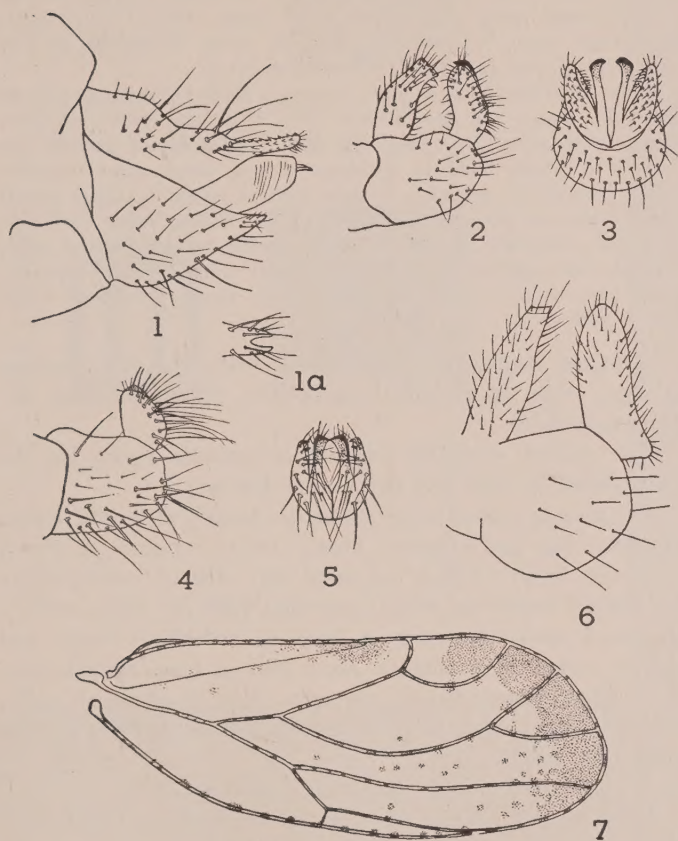
Euphalerus certus Tuthill, new species

(Figs. 6, 7)

Length to tip of folded wings, 4 mm.

Color: Ground color yellow, profusely spotted with small brown dots. Forewings hyaline except maculations as figured.

Structure: Entire body finely rugose. Head much narrower than thorax, strongly deflexed. Vertex twice as wide as long, with deep transverse sulcus, overhanging large median ocellus anteriorly. Genal processes 0.5 as long as vertex, rounded, contiguous, somewhat depressed from plane of vertex, with numerous large setae. Antennae slender, slightly more than 2.5 times as long as width of head. Eyes large. Thorax large, strongly arched. Pronotum vertical medially, nearly horizontal at lateral margins.



EXPLANATION OF FIGURES

- Fig. 1—*Psylla bipartita*, lateral view of female genitalia.
 Fig. 1a—*Psylla bipartita*, ventral view of tip of ventral valve of female genital segment.
 Fig. 2—*Psylla bipartita*, lateral view of male genitalia.
 Fig. 3—*Psylla bipartita*, caudal view of male forceps.
 Fig. 4—*Psylla multiplex*, lateral view of male genitalia.
 Fig. 5—*Psylla multiplex*, caudal view of male forceps.
 Fig. 7—*Euphalerus certus*, forewing.

Mesosternum very strongly developed, produced antero-laterally as prominent lobes. Metatibiae with small, blunt, basal spine. Forewings large, 2.5 times as long as wide, somewhat oblique apically, venation as figured, pterostigma large.

Male proctiger long, slender, tapered. Forceps large, nearly as long as proctiger; in lateral view stout, spatulate, with prominent caudal protrusion near base; in caudal view broad basally, incurved in apical half to touching apices, caudo-apical margin black, irregularly serrate. Female genital segment large; dorsal valve attenuate to acute tip, with scattered long setae over surface and numerous very short stiff retrorse setae on apical half; ventral valve shorter than dorsal, ventral margin almost straight from base to blunt apex, apical portion thickly set with small heavy spines.

Holotype, female, no. 58222, United States National Museum, allotype, male, MANZANILLO, COSTA RICA, Chaperno, April 29, 1933, Juan Bello.

This species resembles *Euphalerus gallicola* Ferris but the latter differs in color and structure as follows:

The general ground color cinereous, dorsum of thorax orange medially, legs and abdomen brown, veins of forewings almost uniformly brown; vertex impressed each side of medial suture but without transverse sulcus, pronotum quite flat, long, scarcely depressed anteriorly, spur at base of metatibiae larger and sharper, pterostigma smaller, about half as long, male forceps more slender, tapered to narrow apex, basal projection broader, less prominent, valves of female genital segment without retrorse spines and setae.

No indication of host accompanies these specimens.

Holotype and allotype in United States National Museum.

SOL FELTY LIGHT

Dr. Sol Felty Light, Professor of Zoology at the University of California, died at Clear Lake, California, June 21, 1947. He was 61 years old.

Dr. Light was a general zoologist with a broad knowledge of the comparative anatomy and ecology of all invertebrates. However, his greatest contributions to science were in the fields of taxonomy, biology and caste development of termites.

A full account of Dr. Light's entomological work will appear in an early issue of this journal.